

REMARKS

The instant Amendment is filed in response to the non-final Office Action of October 19, 2006.

Attorney for applicant has made minor revisions to the specification to address formal matters.

Attorney for applicant has canceled claims 1-9, and substituted claims 12-16. Claims 10 and 11 now depend from claim 12. Independent claim 12, and dependent claims 9, 10 and 13-16 are presented for consideration on their merits.

Claim 12 re-states the novel aspect of claim 1, now canceled, with greater clarity. Claim 12 is generic to all species of applicant's invention, and upon allowance, all species of the invention should be considered.

Claim 12 has been amended to include the features of (1) an expansion chamber located at a point below the solar device, (2) a liquid in the expansion chamber that does not undergo a phase transformation, and (3) rotation of the apparatus over an angle of up to 270° from the morning position to the evening position. (Emphases added) Descriptive support for these amendments may be found in Figures 12a and 12b of the present specification, as well as in the corresponding passage in the description on page 11, line 31. The three novel features are unique and unobvious, and are neither disclosed, nor suggested, by the cited prior art.

Claim 13 has been amended to include the feature of the expansion chamber being located under the west-facing edge of the device. Descriptive support for this amendment may be found in Figures 12a and 12b.

Claim 14 has been amended to include the feature of an apparatus comprising a plurality of solar devices. Descriptive support for this amendment may be found in Figures 12a and 12b.

Claim 15 has been amended to include the feature of the support means being attached to a post and being able to swivel relative to the post. Descriptive support for this amendment may be

found in Figures 12a and 12b and on page 11, lines 22-33 of the specification.

Claim 16 has been amended to include the feature of the expansion of the liquid in the expansion chamber causing the support means to swivel relative to the post. Descriptive support for this amendment may be found in Figures 12a and 12b and on page 11, lines 22-33 of the specification.

Previously presented claims 9 and 10 set forth details of the rack and pinion mechanism for adjusting the solar tracking device for use in the Northern or Southern Hemisphere.

The primary reference, cited in the Office Action, namely U.S. Patent 4,235,222, Ionescu, discloses a solar collection system which automatically aligns itself, and a solar energy collection device, (reflector 11, heat collector 12, conduit 57) in response to changes in the solar position. The alignment system comprises a directional sunlight admission element (focussing lens 53) which is adapted to be focussed over a relatively wide azimuth angle..., an infra-red radiation absorbing member (plate 42) having a fixed position relative to the sunlight admission element..., and a heat-responsive adjustment means (29) in heat-conductive association with said radiation absorbing member, as shown in FIGS. 3-5. Adjustment means (29) include an arcuate cylinder (43) filled with a heat-flowable material (49), that is reduced to flowable condition by the application of heat; note column 3, lines 24-30.

US 4,235,222 discloses a device which is pivotable in a given direction over an angle of up to only 48° (column 9, lines 1-6). By contrast, applicant provides means for the solar tracker apparatus to rotate over an angle of up to 270° and allows the present invention to more effectively track the movement of the sun. The Ionescu device only tracks the sun across a portion of its daily arc, and therefore does not collect solar energy as efficiently as the present invention.

Furthermore, the Ionescu device makes use of an arcuate cylinder (43) containing a heat-flowable solid material (49) that

must undergo a phase transformation to a liquid or gaseous state (column 3, lines 25-30) to cause rotation of the device. By contrast, the present invention makes use of an expansion chamber containing a liquid that expands but does not undergo a phase transformation when heated. This is an important feature of the present invention, as claimed, and contributes significantly to the efficient working of the device. Before the Ionescu device can begin to track the movement of the sun, the solid material in the cylinder must heat up and undergo a phase transformation. Thus, a great deal of energy is required to effect this phase transformation before the device can begin to operate efficiently, as there will be a time lag between when the solar energy first hitting the cylinder and when the device begins to track as the solid material heats up and melts or sublimates.

By contrast, in the present invention, as soon as solar energy hits the expansion chamber, the liquid will begin to expand and the device will begin to track the movement of the sun. This provides the present invention with a significant advantage over the disclosure of Ionescu. As such, attorney for applicant respectfully rejects the Examiner's assertion that the liquid in the expansion chamber of the present invention having a boiling point greater than the maximum operating temperature is an inherent feature, as it is clear that the solid material used in the Ionescu device has a phase transformation temperature well below the maximum operating temperature.

Thus, attorney for applicant respectfully submit that the present invention is not anticipated by the disclosure of the Ionescu document.

In light of the preceding arguments, attorney for applicant respectfully submits that the Examiner's rejection of claim 12 is moot, as is any rejection of the claims dependent upon claim 12.

In Item 5 of the Report, the Examiner contends that the present invention is anticipated by both EP 1241416 to Cantore and

WO 92/11496 to Ackeret. Here, again, for reasons advanced above, attorney for applicant submits that such rejection is no longer applicable.

The Cantore document discloses a solar panel system (1) in which solar panels (2,3) are connected to a support structure (4). The support structure rotates around a fixed tank (5) containing a liquid which expands when exposed to solar radiation and which is connected to one or more pistons (6) which are displaced by the expansion of the liquid, thus causing the solar panels (2,3) to rotate around a longitudinal axis. The fixed tank (5) is located in a central position with solar panels either side of the tank. The tank also projects above the level of the surface of the solar panels.

By contrast, the solar tracking apparatus of the present invention is directed towards a device wherein a liquid-containing cylinder and expansion chamber is located at a point below the solar device. The liquid in the expansion chamber expands upon exposure to solar radiation, thus acting on a piston and causing the rotation of the solar tracking apparatus. As the device rotates, the solar device or the support means shields the expansion chamber from excessive exposure to solar radiation, thereby preventing a further increase in the liquid contained within the expansion chamber. If the expansion chamber were placed elsewhere - for instance where it was exposed to full sunlight - the temperature of the liquid would continue to increase unchecked. If this happened, the device would rotate to its evening position producing a decrease in the efficiency of the collection of solar radiation.

While the Cantore document also recognises the benefit in shielding the expansion chamber from excessive direct sunlight, placing the expansion chamber at a point below the solar device provides the present invention with two major advantages over the disclosure of the Cantore document. Firstly, by placing the expansion chamber at a point below the solar device the present

invention removes the requirement of providing the device with a screen for preventing the overheating of the liquid in the expansion tube, as disclosed by the Cantore document. Instead, the present invention utilises the solar device or the support means itself as a screen. This reduces the number of parts required in the construction of the device, reducing the cost and difficulty of manufacture of the present invention. Furthermore, the location of the expansion chamber at a point below the solar device means that the exposed upper surface of the device may be comprised entirely of solar panels. For the device in the cited document to comprise an identical surface area of solar panels, the device must be made larger in order to accommodate the fixed tank protruding above the surface of the solar panels. Making the device larger to achieve the same surface area of solar panels will result in increased manufacturing costs, increased weight of the device and a reduction in the efficiency of its operation.

Thus, attorney for applicant respectfully submits that the present invention, as presently claimed is not anticipated, or rendered obvious by the disclosure of the Cantore document.

The solar tracking device of Ackeret comprises two cylinders housed within parabolic reflectors. The cylinders contain a low boiling point liquid which boils to form a gas upon exposure to sufficient solar radiation. The cylinders are attached to fixed stems which in turn are connected to wings. The expansion of the cylinders causes the fixed stems to rotate the wings, thus adjusting the angle of the solar tracking device.

Attorney for applicant respectfully submits that the device of the prior art document is vastly different to the device of the present invention. Firstly, the prior art device requires the use of two cylinders housed in parabolic reflectors. By contrast, the present invention makes use of one cylinder and does not require the use of a parabolic reflector, a significant advance. Secondly, the cylinder and expansion chamber of the present invention contains a liquid which expands but does not

undergo a phase transformation on contact with solar radiation, unlike the cited document in which the liquid contained within the cylinder must be boiled and undergo a transformation to a gas in order to cause rotation of the device. Thirdly, the expansion of the prior art cylinder acts on fixed stems connected to wings to cause the movement of the solar tracking device. By contrast, in the present invention, the liquid contained in the cylinder and expansion chamber expands and acts on a piston to cause the device to track. These significant distinctions are emphasized in the claims of record.

Again, attorney for applicant respectfully submits that the feature of the liquid having a boiling point greater than the maximum operating temperature of the cylinder cannot be inherent, as the Ackeret document discloses a liquid that must be boiled in order to cause the device to begin to function. Clearly then, the boiling point of the liquid in the Ackeret document is lower than the maximum operating temperature of the cylinder.

Furthermore, the present invention provides a number of advantages over the cited prior art document as outlined on page 2 of the present specification. These include that parabolic reflectors require significant maintenance and that the reflector must be kept very clean in order to function efficiently. In addition, significant heat is required to boil the liquid within the cylinders, meaning there is a period of lag between the cylinders first being exposed to solar radiation and the device beginning to track. Finally, the cited prior art device does not return to an east facing position at the end of the day, meaning that the device must first heat up and turn eastwards on exposure to solar radiation the following morning in order to begin tracking the movement of the sun. All of these factors serve to reduce the efficiency of the prior art device. The present invention manages to overcome all of these disadvantages, thereby providing a solar tracking device which not only more efficiently tracks the movement

of the sun, but also requires less maintenance and is of simpler construction.

Thus, attorney for applicant respectfully submits that the present invention is not anticipated by the disclosure of the Ackeret document.

The rejection of item 2 has now been overcome by the amendment of the claims.

In summary, attorney for applicant requests favourable reconsideration of the application in light of the foregoing discussion.

While every effort has been made to rebut each objection or rejection advanced in the Office Action of October 19, 2006, if some point has been overlooked, or if a telephone interview might expedite prosecution, the Examiner is invited to call the undersigned attorney at 703-415-0100.

Respectfully submitted,

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Date

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